2005 Hurricane Season Impacts on U.S. Navy

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Katrina resulted in significant loss of communications, server outages and widely dispersed personnel (NAVO)

MSRC remained operational

Loss of communications and integral personnel resulted in the following product disruption:
  - Ocean Models
  - Ice Models
  - Tide Models
  - Wave Models
  - Unique Navy Classified Support

Most model support returned to operational status within two weeks
NAVO Receives Backup from FNMOC and NOAA during KATRINA

- MCSST backup from NOAA NESDIS
- FNMOC assumed CNMOC central communication and command & control functions and backed up NAVO high priority Ocean products until normal operations were restored:
  - WW3 substituted for WAM
  - Navy Coupled Ocean Data Assimilation (NCODA) provided a limited replacement for MODAS
The Navy NOGAPS and GFDN models correctly predicted the track and timing of Hurricane Katrina prior to other major models used in the 5-member consensus forecast.

**CONU = NGPS, GFDN, GFS, GFDL, UKMO**

**CON3 = GFS, GFDL, UKMO**
Overall 2005 North Atlantic Tropical Cyclone Model Performance

2005 North Atlantic Forecast Track Error

- NGPI
- GFNI
- AVNI
- GFDI
- OFCL
- CONU

Forecast Track Error (nm)

# Cases: (378) 12, (322) 24, (285) 36, (244) 48, (176) 72, (120) 96, (70) 120

Forecast Time (hrs)
Navy’s Research and Development Efforts
Enabling Factor for Tropical Meteorology

• Automated Tropical Cyclone Forecast (ATCF) system developed by Naval Research Laboratory (NRL), Monterey to optimize the forecasting process.

  • Operational Users include:
    • Joint Typhoon Warning Center
    • National Hurricane Center
    • Central Pacific Hurricane Center

• Navy sponsored R&D includes:
  • Tropical Cyclone Genesis
  • Probabilistic Prediction of High Impact Weather
  • Multi-Scale Tropical Dynamics

• Developmental efforts in Ocean Coupling and Data Assimilation directly enable TC track and intensity forecasts
Navy’s Partnerships Enable Tropical Met Capabilities

- Ongoing commitment to Joint Typhoon Warning Center
- Naval Officer assigned to TPC/NHC
- Naval Research Laboratory modeling initiatives
- Tri-Agency community modeling initiative
- Committee for Operational Processing Centers (COPC)
- NPOESS satellite
Value of Remote Sensing
Navy Commitment to NPOESS

Multispectral Imagery
...combined with Microwaves...
...and Altimeter-Derived Ocean Heat Content...

... Improves Tropical Cyclone Forecasts & Reduced Impact on Maritime Forces
Lessons Learned

• Operational / Production Centers must ensure “back-up” capability and capacity
  - computer processing
  - communications
  - personnel

• Comprehensive personnel accountability plan

• Maintenance of agency mission unique requirements

• Partnerships are key to meeting today’s and tomorrow’s requirements in Tropical Meteorology and specifically Tropical Cyclone forecasting.
Questions?
Backup Slides
Overall 2005 Western Pacific Tropical Cyclone Model Performance

2005 West Pacific Forecast Track Error

- NGPI
- GFNI
- AVNI
- EGRI
- JTWC
- CONW

Forecast Track Error (nm)

# Cases:

- (345) 12
- (321) 24
- (289) 36
- (257) 48
- (165) 72
- (101) 96
- (55) 120

Forecast Time (hrs)